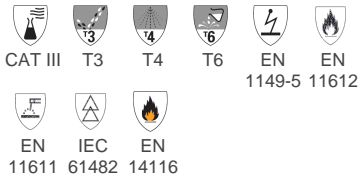


DuPont™ Tychem® ThermoPro , TP0198TORCE



Product Description

DuPont™ Tychem® ThermoPro. Hooded coverall with drawstrings. Stitched and over-taped seams. Elastication at wrists, open ankles. Double storm flap, zipper and hook and loop closure system. Orange.

Certifications

- Chemical protective clothing, Category III, Type 3, 4 and 6
- Inherently antistatic (EN 1149-5) - on inside
- EN ISO 11612 (heat and flame), EN ISO 14116 (limited flame spread), IEC 61482-2 (electric arc), EN ISO 11611 (welding and allied processes)
- Certified to NFPA 1992, NFPA 2112, and the Category 2 Requirements of NFPA 70E

Packaging (Quantity/Box)

2 per box

Size	Article Number	Chest Girth(cm)	Body Height(cm)	Chest Girth(in)	Body Height(ft/in)
SM	D15482658	78-87	150-160	30 3/4-34 1/4	5'0"-5'7"
MD	D15482662	87-97	160-170	34 3/4-38 1/4	5'3"-5'7"
LG	D15482674	97-107	165-175	38 3/4-42 1/4	5'5"-5'9"
XL	D15482689	107-117	173-188	42 3/4-46 1/4	5'8"-6'2"
2X	D15482697	117-127	183-193	46 3/4-50 1/4	6'0"-6'4"
3X	D15482700	127-137	188-193	50 1/4-53 3/4	6'2"-6'4"
4X	D15482714	137-147	193-200	54 3/4-58 1/4	6'4"-6'7"

Reference Number: TP0198TORCE

Physical Properties

Property	Test Method	Result	EN Class
Colour	N/A	Orange	N/A
Basis Weight	DIN EN ISO 536	280 g/m ²	N/A
Thickness	DIN EN ISO 534	860 µm	N/A
Abrasion Resistance ⁷	EN 530 Method 2	>2000 cycles	6 of 6 ¹
Flex Cracking Resistance ⁷	EN ISO 7854 Method B	>1000 cycles	1 of 6 ¹
Flex Cracking Resistance at -30 °C	EN ISO 7854 Method B	>4000 cycles	6 of 6 ¹
Trapezoidal Tear Resistance (MD)	EN ISO 9073-4	>100 N	5 of 6 ¹
Trapezoidal Tear Resistance (XD)	EN ISO 9073-4	>100 N	5 of 6 ¹
Tensile Strength (MD)	DIN EN ISO 13934-1	>500 N	5 of 6 ¹
Tensile Strength (XD)	DIN EN ISO 13934-1	>500 N	5 of 6 ¹
Puncture Resistance	EN 863	>10 N	2 of 6 ¹
Charge decay, inside ⁷	EN 1149-3	t< ₅₀ <4s or S>0.2, Pass ¹⁴	N/A
Charge decay, outside ⁷	EN 1149-3	No decay, outside	N/A

1 According to EN 14325 2 According to EN 14126 3 According to EN 1073-2 4 According to EN 14116 12 According to EN 11612 5 Front Tyvek® / Back 6 Based on test according to ASTM D-572 7 See Instructions for Use for further information, limitations and warnings > Larger than < Smaller than N/A Not Applicable STD DEV Standard Deviation

Garment Performance

Property	Test Method	Result	EN Class
Type 3: Resistance to Penetration by Liquids (Jet Test)	EN 17491-3	Pass ⁷	N/A
Type 4: Resistance to Penetration by Liquids (High Level Spray Test)	EN ISO 17491-4, Method B	Pass	N/A
Type 6: Resistance to Penetration by Liquids (Low Level Spray Test)	EN ISO 17491-4, Method A	Pass	N/A
Seam Strength	EN ISO 13935-2	>300 N	5 of 6 ¹
Shelf Life ⁷	N/A	5 years	N/A

1 According to EN 14325 3 According to EN 1073-2 12 According to EN 11612 13 According to EN 11611 5 Front Tyvek® / Back 6 Based on test according to ASTM D-572 7 See Instructions for Use for further information, limitations and warnings 11 Based on the average of 10 suits, 3 activities, 3 probes > Larger than < Smaller than N/A Not Applicable * Based on lowest single value

Penetration and Repellency

Property	Test Method	Result	EN Class
Resistance to Penetration by Liquids, Sulphuric Acid (30%)	EN ISO 6530	<1 %	3 of 3 ¹
Resistance to Penetration by Liquids, Sodium Hydroxide (10%)	EN ISO 6530	<1 %	3 of 3 ¹
Resistance to Penetration by Liquids, o-Xylene	EN ISO 6530	<1 %	3 of 3 ¹
Resistance to Penetration by Liquids, Butan-1-ol	EN ISO 6530	<1 %	3 of 3 ¹
Repellency to Liquids, Sulphuric Acid (30%)	EN ISO 6530	>95 %	3 of 3 ¹
Repellency to Liquids, Sodium Hydroxide (10%)	EN ISO 6530	>95 %	3 of 3 ¹
Repellency to Liquids, o-Xylene	EN ISO 6530	>95 %	3 of 3 ¹
Repellency to Liquids, Butan-1-ol	EN ISO 6530	>95 %	3 of 3 ¹

¹ According to EN 14325 > Larger than < Smaller than

Biological Barrier

Property	Test Method	Result	EN Class
Resistance to Penetration by Blood and Body Fluids using Synthetic Blood	ISO 16603	Pass	6 of 6 ²
Resistance to Penetration by Blood-borne Pathogens using Bacteriophage Phi-X174	ISO 16604 Procedure C	20 kPa	6 of 6 ²
Resistance to Penetration by Contaminated Liquids	EN ISO 22610	>75 min	6 of 6 ²
Resistance to Penetration by Biologically Contaminated Aerosols	ISO/DIS 22611	log ratio >5	3 of 3 ²
Resistance to Penetration by Contaminated Solid Particles	ISO 22612	log cfu <1	3 of 3 ²

² According to EN 14126 > Larger than < Smaller than

Welding and allied processes

Property	Test Method	Result	EN Class
Small molten metal splashes	ISO 9150	>25 drops	2 of 2 ¹³
Tear Strength	ISO 13937-2	>20 N	N/A
Electrical resistance	EN 1149-2	>10 ⁵ Ohm, Pass	N/A
Type of welder's clothing	EN 1149-2	See Instructions for Use for further information	1 of 2 ¹³

4 According to EN 14116 13 According to EN 11611

Heat and Flame, Arc

Property	Test Method	Result	EN Class
Heat resistance at temperature of 180 °C/-5°C	ISO 17493	Pass	N/A
Heat resistance at temperature of 260 °C/-5°C	ISO 17493	Pass	N/A
Limited flame spread (surface ignition), Code letter A1	EN ISO 15025:2003 procedure A	Pass	A1, Index 3 ⁴
Convection heat, Code letter B	ISO 9151	B1	N/A
Radiant heat, Code letter C	ISO 6942, Method B	C1	N/A
Molten aluminium splash, Code letter D	ISO 9185	D1	N/A
Molten iron splash, Code letter E	ISO 12127	E2	N/A
Contact heat, Code letter F	ISO 12127	F2	N/A
Electric arc- Open arc test	IEC 661482-1-1 open arc	ATPV=15cal/cm ²	N/A
Electric arc- Box test	IEC 661482-1-2 box	4kA	1 of 2 ¹²

4 According to EN 14116 12 According to EN 11612

Permeation Data for Tychem® 6000 FR

Hazard Name	Physical State	CAS	BT Act	BT 0.1	BT 1.0	EN	SSPR	MDPR	Cum 480 Time 150	ISO	
2-(2-Butoxyethoxy) ethanol	Liquid	112-34-5	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Acetaldehyde	Liquid	75-07-0	>480	>480	>480	6	<0.1	0.1			
Acetic acid (>95%)	Liquid	64-19-7	>480	>480	>480	6	<0.027	0.027	<13	>480	6
Acetic acid 2 ethoxy ethyl ester	Liquid	111-15-9	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Acetic acid 2 methoxy ethyl ester	Liquid	110-49-6	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Acetic acid ethyl ester	Liquid	141-78-6	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Acetic acid pentyl ester	Liquid	628-63-7	12*	136*	>480	6	0.007	0.001			
Acetic anhydride	Liquid	108-24-7	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Acetic chloride	Liquid	75-36-5	155	>480	>480	6	0.0014	0.0001			
Acetone	Liquid	67-64-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Acetone cyanohydrin	Liquid	75-86-5	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Acetonitrile	Liquid	75-05-8	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Acetyl chloride	Liquid	75-36-5	155	>480	>480	6	0.0014	0.0001			
Acroleic acid	Liquid	79-10-7	>480	>480	>480	6	<0.06	0.06	<28.8	>480	6
Acrolein	Liquid	107-02-8	51*	75*	>480	6	<0.5	0.02	105	>480	6
Acryl amide (50%)	Liquid	79-06-1	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Acrylic acid	Liquid	79-10-7	>480	>480	>480	6	<0.06	0.06	<28.8	>480	6
Acrylic amide (50%)	Liquid	79-06-1	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Acrylonitrile	Liquid	107-13-1	4	8*	>480	6	0.57	0.01			
Acryloyl Chloride	Liquid	814-68-6	166*	334	>480	6	<0.3	0.04	29.6	>480	6
Adipic acid dinitrile	Liquid	111-69-3	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Adipic acid nitrile	Liquid	111-69-3	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Adiponitrile	Liquid	111-69-3	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Adipyl dinitrile	Liquid	111-69-3	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Allyl alcohol	Liquid	107-18-6	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Allyl chloride	Liquid	107-05-1	291*	381*	>480	6	<0.02	0.02	<18.5	>480	6
Amino benzene	Liquid	62-53-3	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Amino diphenyl, 4- (1 mg/ml in Methanol)	Liquid	92-67-1	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Amino ethanol, 2-	Liquid	141-43-5	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Amino ethylethanolamine	Liquid	111-41-1	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Amino ethylethanolamine (60%)	Liquid	111-41-1	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Amino ethylpiperazine	Liquid	140-31-8	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Amino propane, 2-	Liquid	75-31-0	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Ammonia (gaseous)	Vapor	7664-41-7	15	90	>480	6	0.349	0.05			
Ammonium bifluoride (sat)	Liquid	1341-49-7	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Ammonium hydrogendifluoride (sat)	Liquid	1341-49-7	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Ammonium hydroxide (2-3% in Householdcleaner)	Liquid	1336-21-6	>480	>480	>480	6	<0.05	0.05	9.81	>480	6
Ammonium hydroxide (32%)	Liquid	1336-21-6	30	35	>480	6	na	0.05	40.7	>480	6
Amyl acetate, n-	Liquid	628-63-7	12*	136*	>480	6	0.007	0.001			

BT Act (Actual) Breakthrough time at MDPR [mins] BT 0.1 Normalized breakthrough time at 0.1 µg/cm²/min [mins] BT 1.0 Normalized breakthrough time at 1.0 µg/cm²/min [mins] EN Classification according to EN 14325
 SSPR Steady state permeation rate [µg/cm²/min] MDPR Minimum detectable permeation rate [µg/cm²/min] CUM 480 Cumulative permeation mass after 480 mins [µg/cm²] Time 150 Time to reach cumulative permeation mass of 150 µg/cm² [mins] ISO Classification according to ISO 16602 CAS Chemical abstracts service registry number mins Minutes > Larger than < Smaller than imm Immediate (< 4 min) nm Not tested
 sat Saturated solution N/A Not Applicable * Based on lowest single value na Not attained 8 Actual breakthrough time; normalized breakthrough time is not available

Permeation Data for Tychem® 6000 FR

Hazard Name	Physical State	CAS	BT Act	BT 0.1	BT 1.0	EN	SSPR	MDPR	Cum 480 Time 150	ISO
Amyl ester acetic acid	Liquid	628-63-7	12*	136*	>480	6	0.007	0.001		
Anilin, 4-Trifluoromethoxy-	Liquid	461-82-5	>480	>480	>480	6	<0.05	0.05	<24	>480 6
Aniline	Liquid	62-53-3	>480	>480	>480	6	<0.02	0.02	<9.6	>480 6
Anthracene (sat in Toluene)	Liquid	120-12-7	>480	>480	>480	6	<0.02	0.02	<9.6	>480 6
Anthracin (sat in Toluene)	Liquid	120-12-7	>480	>480	>480	6	<0.02	0.02	<9.6	>480 6
Antimony pentachloride	Liquid	7647-18-9	<15	<15	<15	1	>10	0.1		
Arsenic (III) chloride	Liquid	7784-34-1	22*	32*	59*	2	334	0.01		
Arsenic trichloride	Liquid	7784-34-1	22*	32*	59*	2	334	0.01		
Azolidine	Liquid	123-75-1	40*	45*	145*	4	4.7	0.05		
Benzenamine	Liquid	62-53-3	>480	>480	>480	6	<0.02	0.02	<9.6	>480 6
Benzene	Liquid	71-43-2	>480	>480	>480	6	<0.005	0.005	<2.4	>480 6
Benzene carbonyl chloride	Liquid	98-88-4	>480	>480	>480	6	<0.08	0.08	<38.4	>480 6
Benzene sulfone chloride	Liquid	98-09-9	>480	>480	>480	6	<0.02	0.02	<9.6	>480 6
Benzene sulfonyl chloride	Liquid	98-09-9	>480	>480	>480	6	<0.02	0.02	<9.6	>480 6
Benzo nitrile	Liquid	100-47-0	>480	>480	>480	6	<0.02	0.02	<9.6	>480 6
Benzol	Liquid	71-43-2	>480	>480	>480	6	<0.005	0.005	<2.4	>480 6
Benzoyl chloride	Liquid	98-88-4	>480	>480	>480	6	<0.08	0.08	<38.4	>480 6
Benzyl alcohol	Liquid	100-51-6	>480	>480	>480	6	<0.1	0.1	<48	>480 6
Benzyl chloride	Liquid	100-44-7	>480	>480	>480	6	<0.05	0.05	<24	>480 6
Benzyl cyanide	Liquid	140-29-4	>390	>390	>390	5	<0.01	0.01	<4.8	>480 6
Benzyl methylamine, N-	Liquid	103-67-3	>480	>480	>480	6	>0.02	0.02	<9.6	>480 6
Bis (4-(2,3-epoxypropoxy)phenyl)propane	Liquid	1675-54-3	>480	>480	>480	6	<0.01	0.01	<4.8	>480 6
Bis phenol A diglycidyl ether	Liquid	1675-54-3	>480	>480	>480	6	<0.01	0.01	<4.8	>480 6
Boron fluoride ethyl ether	Liquid	109-63-7	>480	>480	>480	6	<0.05	0.05	<24	>480 6
Boron trifluoride diethyl etherate	Liquid	109-63-7	>480	>480	>480	6	<0.05	0.05	<24	>480 6
Boron trifluoride dimethyl etherate	Liquid	353-42-4	>480	>480	>480	6	<0.01	0.01	<4.8	>480 6
Boron trifluoride etherate	Liquid	109-63-7	>480	>480	>480	6	<0.05	0.05	<24	>480 6
Bromine	Liquid	7726-95-6	imm	imm	nm		105	0.001		
Bromo 4-fluorobenzene, 1-	Liquid	460-00-4	>480	>480	>480	6	<0.02	0.02	<9.6	>480 6
Bromo fluorobenzene, 4-	Liquid	460-00-4	>480	>480	>480	6	<0.02	0.02	<9.6	>480 6
But-3-en-2-one	Liquid	78-94-4	287*	>480	>480	6	<0.02	0.02	<9.6	>480 6
Butadiene, 1,3- (gaseous)	Vapor	106-99-0	>480	>480	>480	6	<0.02	0.02	<9.6	>480 6
Butanol, 1-	Liquid	71-36-3	>480	>480	>480	6	<0.05	0.05	<24	>480 6
Butanol, n-	Liquid	71-36-3	>480	>480	>480	6	<0.05	0.05	<24	>480 6
Butanol, tert-	Liquid	75-65-0	10*	37*	>480	6	0.26	0.02		
Butanone	Liquid	78-93-3	imm	40*	>480	6	0.36	0.001		
Butanone oxime, 2-	Liquid	96-29-7	>480	>480	>480	6	<0.02	0.02	<9.6	>480 6
Butoxy ethanol, 2-	Liquid	111-76-2	>480	>480	>480	6	<0.05	0.05	<24	>480 6
Butyl acetate, n-	Liquid	123-86-4	>480	>480	>480	6	<0.02	0.02	<9.6	>480 6

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Permeation Data for Tychem® 6000 FR

Hazard Name	Physical State	CAS	BT Act	BT 0.1	BT 1.0	EN	SSPR	MDPR	Cum 480	Time 150	ISO
Butyl ether, n-	Liquid	142-96-1	4*	192*	>480	6	0.13	0.001			
Butyl stannium trichloride	Liquid	1118-46-3	>480	>480	>480	6	<0.0001	0.0001	<0.04	>480	6
Calomel (sat)	Liquid	10112-91-1	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Carbon disulfide	Liquid	75-15-0	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Carbon tetrachloride	Liquid	56-23-5	4*	4*	>480	6	0.57	0.001			
Caustic ammonia (2-3% in Household cleaner)	Liquid	1336-21-6	>480	>480	>480	6	<0.05	0.05	9.81	>480	6
Caustic ammonia (32%)	Liquid	1336-21-6	30	35	>480	6	na	0.05	40.7	>480	6
Caustic soda (50%)	Liquid	1310-73-2	>480	>480	>480	6	<0.025	0.025	<12	>480	6
Chlor allylene	Liquid	107-05-1	291*	381*	>480	6	<0.02	0.02	<18.5	>480	6
Chlor trinitromethan	Liquid	76-06-2	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Chlorine (gaseous)	Vapor	7782-50-5	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Chloro 1,3-butadiene, 2- (50% in Butanol)	Liquid	126-99-8	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Chloro 1-methylbenzene, 2-	Liquid	95-49-8	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Chloro 2,3-epoxy propane, 1-	Liquid	106-89-8	355	395	>480	6	<0.4	0.02	18.4	>480	6
Chloro 2-nitrobenzene, 1- (35-40 °C, molten)	Liquid	88-73-3	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Chloro acetic acid (80%)	Liquid	79-11-8	>480	>480	>180	6	<0.005	0.005	<2.4	>480	6
Chloro acetone (95%)	Liquid	78-95-5	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Chloro acrylonitrile, 2-	Liquid	920-37-6	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Chloro benzene	Liquid	108-90-7	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Chloro buta-1,3-diene, 2- (50% in Butanol)	Liquid	126-99-8	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Chloro ethanol, 2-	Liquid	107-07-3	>480	>480	>480	6	<0.06	0.06	<28.8	>480	6
Chloro ethene	Vapor	75-01-4	imm	>480	>480	6	0.02	0.001	<9.6	>480	6
Chloro form	Liquid	67-66-3	4*	8	8		10.6	0.001			
Chloro methyl methyl ether	Liquid	107-30-2	imm*	8*	>480	6	0.75	0.001			
Chloro picrin	Liquid	76-06-2	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Chloro prene (50% in Butanol)	Liquid	126-99-8	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Chloro prene, 3-	Liquid	107-05-1	291*	381*	>480	6	<0.02	0.02	<18.5	>480	6
Chloro propan-2-one, 1- (95%)	Liquid	78-95-5	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Chloro toluene, alpha-	Liquid	100-44-7	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Chloro toluene, o-	Liquid	95-49-8	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Chlorosulfonic acid	Liquid	7790-94-5	17	17	18	1	na	0.05	20026		
Citric acid (sat)	Liquid	77-92-9	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Creosote	Liquid	8001-58-9	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Cresol o-	Liquid	95-48-7	173	179	211	4	<4	0.02	674	295	5
Cumene	Liquid	98-82-8	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Cyanobenzene	Liquid	100-47-0	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Cyanoethylene	Liquid	107-13-1	4	8*	>480	6	0.57	0.01			
Cyanomethane	Liquid	75-05-8	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Cyanopropan-2-ol, 2-	Liquid	75-86-5	>480	>480	>480	6	<0.05	0.05	<24	>480	6

BT Act (Actual) Breakthrough time at MDPR [mins] BT 0.1 Normalized breakthrough time at 0.1 µg/cm²/min [mins] BT 1.0 Normalized breakthrough time at 1.0 µg/cm²/min [mins] EN Classification according to EN 14325
 SSPR Steady state permeation rate [µg/cm²/min] MDPR Minimum detectable permeation rate [µg/cm²/min] CUM 480 Cumulative permeation mass after 480 mins [µg/cm²] Time 150 Time to reach cumulative permeation mass of 150 µg/cm² [mins] ISO Classification according to ISO 16602 CAS Chemical abstracts service registry number mins Minutes > Larger than < Smaller than imm Immediate (< 4 min) nm Not tested
 sat Saturated solution N/A Not Applicable * Based on lowest single value na Not attained 8 Actual breakthrough time; normalized breakthrough time is not available

Permeation Data for Tychem® 6000 FR

Hazard Name	Physical State	CAS	BT Act	BT 0.1	BT 1.0	EN	SSPR	MDPR	Cum 480 Time 150	ISO	ISO
Cyclo hexanone	Liquid	108-94-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Diamine	Liquid	302-01-2	269	283	352	5	2.3	0.001			
Diaminoethane, 1,2-	Liquid	107-15-3	>480	>480	>480	6	<0.0097	0.0097	<4.7	>480	6
Dibromoethane, 1,2-	Liquid	106-93-4	84*	144*	>480	6	0.52	0.001			
Dibutyl 1,2-benzenedicarboxylate	Liquid	84-74-2	nm	nm	>480	6	<0.05	0.05	<24	>480	6
Dibutyl phthalate	Liquid	84-74-2	nm	nm	>480	6	<0.05	0.05	<24	>480	6
Dibutyl sebacate	Liquid	109-43-3	nm	nm	>480	6	<1	1			
Dichlorethane, 1,2.-	Liquid	107-06-2	65*	93	109	3	<3	0.04	898	182	4
Dichloro -2-propanone, 1,3- (45 °C, molten)	Liquid	534-07-6	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Dichloro acetone, 1,3- (45 °C, molten)	Liquid	534-07-6	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Dichloro acetyl chloride	Liquid	79-36-7	160	160	180	4	78.41	0.01			
Dichloro ethyl ether	Liquid	111-44-4	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Dichloro ethylene, 1,1-	Liquid	75-35-4	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Dichloro methane	Liquid	75-09-2	imm	imm	imm		12.7	0.04			
Dichloro propene, 2,3-	Liquid	78-88-6	4*	4*	54*	2	2.4	0.001			
Dicyanobutane, 1,4-	Liquid	111-69-3	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Diethyl amine	Liquid	109-89-7	>480	>480	>480	6	<0.05	0.05	<9.6	>480	6
Diethyl benzene (95%)	Liquid	25340-17-4	>480	>480	>480	6	<0.022	0.022	<10.6	>480	6
Diethyl ethanamine, N,N-	Liquid	121-44-8	>480	>480	>480	6	0.05	0.05	<24	>480	6
Diethyl ether	Liquid	60-29-7	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Diethyl sulfate	Liquid	64-67-5	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Diethylene glycol monobutyl ether	Liquid	112-34-5	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Diethylene triamine	Liquid	111-40-0	5	>480	>480	6	<0.01	0.005	<4.8	>480	6
Dimethyl acetamide, N,N-	Liquid	127-19-5	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Dimethyl amine	Vapor	124-40-3	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Dimethyl aniline, N,N-	Liquid	121-69-7	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Dimethyl dichlorosilane	Liquid	75-78-5	>480	>480	>480	6	<0.0001	0.0001	<0.04	>480	6
Dimethyl formamide, N,N-	Liquid	68-12-2	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Dimethyl ketal	Liquid	67-64-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Dimethyl ketone	Liquid	67-64-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Dimethyl nitrosamine	Liquid	62-75-9	>480	>480	>480	6	<0.001	0.001	<0.48	>480	6
Dimethyl phenylamine, N,N-	Liquid	121-69-7	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Dimethyl sulfate	Liquid	77-78-1	>480	>480	>480	6	<0.09	0.09	<43.2	>480	6
Dimethyl sulfide	Liquid	75-18-3	83*	271	452	5	1.21	0.02			
Dimethyl sulfoxide	Liquid	67-68-5	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Dioxane, 1,4-	Liquid	123-91-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Diphenyl methane diisocyanate, 4,4'- (50 °C, molten)	Liquid	101-68-8	>480	>480	>480	6	<0.0403	0.0403	<19.3	>480	6
Epichlorohydrin	Liquid	106-89-8	355	395	>480	6	<0.4	0.02	18.4	>480	6
Epoxy ethane (gaseous)	Vapor	75-21-8	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6

BT Act (Actual) Breakthrough time at MDPR [mins] BT 0.1 Normalized breakthrough time at 0.1 µg/cm²/min [mins] BT 1.0 Normalized breakthrough time at 1.0 µg/cm²/min [mins] EN Classification according to EN 14325
 SSPR Steady state permeation rate [µg/cm²/min] MDPR Minimum detectable permeation rate [µg/cm²/min] CUM 480 Cumulative permeation mass after 480 mins [µg/cm²] Time 150 Time to reach cumulative permeation mass of 150 µg/cm² [mins] ISO Classification according to ISO 16602 CAS Chemical abstracts service registry number mins Minutes > Larger than < Smaller than imm Immediate (< 4 min) nm Not tested sat Saturated solution N/A Not Applicable * Based on lowest single value na Not attained 8 Actual breakthrough time; normalized breakthrough time is not available

Permeation Data for Tychem® 6000 FR

Hazard Name	Physical State	CAS	BT Act	BT 0.1	BT 1.0	EN	SSPR	MDPR	Cum 480	Time 150	ISO
Ethane dioic acid (sat)	Liquid	144-62-7	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Ethane nitrile	Liquid	75-05-8	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Ethane thiol	Liquid	75-08-1	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Ethane trichloride	Liquid	79-00-5	120*	164*	202*	4	9.1	0.01			
Ethanol	Liquid	64-17-5	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Ethanol amine	Liquid	141-43-5	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Ethanoyl chloride	Liquid	75-36-5	155	>480	>480	6	0.0014	0.0001			
Ethoxy ethanol, 2-	Liquid	110-80-5	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Ethoxy ethylacetat	Liquid	111-15-9	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Ethyl Cellosolve®	Liquid	110-80-5	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Ethyl acetate	Liquid	141-78-6	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Ethyl alcohol	Liquid	64-17-5	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Ethyl benzene	Liquid	100-41-4	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Ethyl ethanamine, N-	Liquid	109-89-7	>480	>480	>480	6	<0.05	0.05	<9.6	>480	6
Ethyl ether	Liquid	60-29-7	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Ethyl glycol acetate	Liquid	111-15-9	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Ethyl mercaptan	Liquid	75-08-1	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Ethyl nitrile	Liquid	75-05-8	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Ethylene carboxylic acid	Liquid	79-10-7	>480	>480	>480	6	<0.06	0.06	<28.8	>480	6
Ethylene chlorohydrin	Liquid	107-07-3	>480	>480	>480	6	<0.06	0.06	<28.8	>480	6
Ethylene diamine	Liquid	107-15-3	>480	>480	>480	6	<0.0097	0.0097	<4.7	>480	6
Ethylene dibromide	Liquid	106-93-4	84*	144*	>480	6	0.52	0.001			
Ethylene dichloride	Liquid	107-06-2	65*	93	109	3	<3	0.04	898	182	4
Ethylene glycol	Liquid	107-21-1	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Ethylene glycol mono ethyl ether acetate	Liquid	111-15-9	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Ethylene glycol monobutyl ether	Liquid	111-76-2	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Ethylene glycol monoethyl ether	Liquid	110-80-5	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Ethylene glycol monomethyl ether	Liquid	109-86-4	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Ethylene glycol monomethyl ether acetate	Liquid	110-49-6	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Ethylene oxide (gaseous)	Vapor	75-21-8	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Ethylene tetrachloride	Liquid	127-18-4	210*	>480	>480	6	<0.03	0.02	9.81	>480	6
Ethylene trichloride	Liquid	79-01-6	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Fluorobenzene	Liquid	462-06-6	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Fluorosilicic acid (33-35%)	Liquid	16961-83-4	>480	>480	>480	6	<0.04	0.04	<19.2	>480	6
Formaldehyde (37%)	Liquid	50-00-0	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Formalin (37%)	Liquid	50-00-0	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Formic acid (50%)	Liquid	64-18-6	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Formic acid (>95%)	Liquid	64-18-6	172	260	>480	6	0.24	0.001			
Furaldehyde, 2-	Liquid	98-01-1	459	>480	>480	6	na	0.03	<14.4	>480	6

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 SSPR Steady state permeation rate [µg/cm²/min] MDPR Minimum detectable permeation rate [µg/cm²/min] CUM 480 Cumulative permeation mass after 480 mins [µg/cm²] Time 150 Time to reach cumulative permeation mass of 150 µg/cm² [mins] ISO Classification according to ISO 16602 CAS Chemical abstracts service registry number mins Minutes > Larger than < Smaller than imm Immediate (< 4 min) nm Not tested
 sat Saturated solution N/A Not Applicable * Based on lowest single value na Not attained 8 Actual breakthrough time; normalized breakthrough time is not available

Permeation Data for Tychem® 6000 FR

Hazard Name	Physical State	CAS	BT Act	BT 0.1	BT 1.0	EN	SSPR	MDPR	Cum 480 Time 150	ISO	
Gasoline, leaded	Liquid	mix	imm	4*	>480	6	0.32	0.001			
Gasoline, unleaded	Liquid	86290-81-5	>480	>480	>480	6	<0.001	0.001	<0.48	>480	6
Glutaral (50%)	Liquid	111-30-8	150	170	200	4	1.861	0.01			
Glutaraldehyde (50%)	Liquid	111-30-8	150	170	200	4	1.861	0.01			
Glycol alcohol	Liquid	107-21-1	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Glycol chlorohydrin	Liquid	107-07-3	>480	>480	>480	6	<0.06	0.06	<28.8	>480	6
Hexafluoro isobutylene	Vapor	382-10-5	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Hexamethylene diamine (45 °C, molten)	Liquid	124-09-4	423	>480	>480	6	0.003	0.0001	<1.44	>480	6
Hexamethylene diisocyanate	Liquid	822-06-0	>480	>480	>480	6	<0.0271	0.0271	<13.0	>480	6
Hexane n-	Liquid	110-54-3	imm	>480	>480	6	<0.03	0.005	<48	>480	6
Hexanone	Liquid	108-94-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Hexone	Liquid	108-10-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Hydrazine	Liquid	302-01-2	269	283	352	5	2.3	0.001			
Hydriodic acid (55-57%)	Liquid	10034-85-2	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Hydrochloric acid (37%)	Liquid	7647-01-0	>480	>480	>480	6	<0.025	0.025	<12	>480	6
Hydrofluoric acid (48%)	Liquid	7664-39-3	15	15	>480	6	na	0.05	187	nm	
Hydrogen bromide (gaseous)	Vapor	10035-10-6	>480	>480	>480	6	<0.05	0.05	9.6	>480	6
Hydrogen chloride (gaseous)	Vapor	7647-01-0	>480	>480	>480	6	<0.025	0.025	<12	>480	6
Hydrogen fluoride (20-27 °C, gaseous)	Vapor	7664-39-3	imm	imm	imm		>50	0.02			
Hydrogen peroxide (50%)	Liquid	7722-84-1	>480	>480	>480	6	<0.025	0.025	<12	>480	6
Hydrogen peroxide (70%)	Liquid	7722-84-1	>480	>480	>480	6	<0.02	0.02	<10	>480	6
Hydroxy 1,2,3-propanetricarboxylic acid, 2- (sat)	Liquid	77-92-9	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Hydroxy 1-ethanethiol, 2-	Liquid	60-24-2	>480	>480	>480	6	<0.08	0.08	<38.4	>480	6
Hydroxy 2-methylpropionitrile, 2-	Liquid	75-86-5	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Hydroxy isobutyronitrile	Liquid	75-86-5	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Hydroxy propene	Liquid	107-18-6	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Hydroxy toluene	Liquid	100-51-6	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Hydroxy toluene, o-	Liquid	95-48-7	173	179	211	4	<4	0.02	674	295	5
Hypophosphorus acid (50%)	Liquid	6303-21-5	>480	>480	>480	6	<0.09	0.09	<43.2	>480	6
Iodomethane	Liquid	74-88-4	254	296	>480	6	nm	0.07	53.6	>480	6
Isobutyl methyl ketone	Liquid	108-10-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Isophthaloyldichloride (45 °C, molten)	Liquid	99-63-8	>480	>480	>480	6	<0.0001	0.0001	<0.04	>480	6
Isopropanol	Liquid	67-63-0	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Isopropanol (70%)	Liquid	67-63-0	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Isopropyl alcohol	Liquid	67-63-0	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Isopropyl alcohol (70%)	Liquid	67-63-0	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Isopropyl amine	Liquid	75-31-0	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Isopropyl benzene	Liquid	98-82-8	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Isopropylidenediphenol diglycidyl ether, 4,4'-	Liquid	1675-54-3	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6

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 SSPR Steady state permeation rate [µg/cm²/min] MDPR Minimum detectable permeation rate [µg/cm²/min] CUM 480 Cumulative permeation mass after 480 mins [µg/cm²] Time 150 Time to reach cumulative permeation mass of 150 µg/cm² [mins] ISO Classification according to ISO 16602 CAS Chemical abstracts service registry number mins Minutes > Larger than < Smaller than imm Immediate (< 4 min) nm Not tested sat Saturated solution N/A Not Applicable * Based on lowest single value na Not attained 8 Actual breakthrough time; normalized breakthrough time is not available

Permeation Data for Tychem® 6000 FR

Hazard Name	Physical State	CAS	BT Act	BT 0.1	BT 1.0	EN	SSPR	MDPR	Cum 480 Time 150	ISO	
Ketone propane	Liquid	67-64-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Lewisite (L), FINABEL 0.7.C	Liquid	541-25-3		>260* 8							
Lewisite (L), MIL-STD-282 (100 g/m ²)	Liquid	541-25-3		360 ⁸							
Limonene d-	Liquid	5989-27-5	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
MEK	Liquid	78-93-3	imm	40*	>480	6	0.36	0.001			
Mercapto acetic acid	Liquid	68-11-1	>480	>480	>480	6	<0.0001	0.0001	<0.04	>480	6
Mercapto ethanol	Liquid	60-24-2	>480	>480	>480	6	<0.08	0.08	<38.4	>480	6
Mercuric I chloride (sat)	Liquid	10112-91-1	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Mercury	Liquid	7439-97-6	>480	>480	>480	6	<0.09	0.09	<43.2	>480	6
Methacrylic acid	Liquid	79-41-4	>480	>480	>480	6	<0.0001	0.0001	<0.04	>480	6
Methanesulfonyl chloride	Liquid	124-63-0	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Methanesulphonic acid (70%)	Liquid	75-75-2	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Methanethiol	Vapor	74-93-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Methanol	Liquid	67-56-1	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Methoxy 2-methylpropane, 2-	Liquid	1634-04-4	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Methoxy chloromethane	Liquid	107-30-2	imm*	8*	>480	6	0.75	0.001			
Methoxy ethanol, 2	Liquid	109-86-4	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Methoxy ethylacetate, 2-	Liquid	110-49-6	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Methyl 1,5-pentanedinitrile, 2-	Liquid	4553-62-2	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Methyl 2-methyl-2-propenoate	Liquid	80-62-6	4*	8*	180*	4	1.4	0.001			
Methyl 2-pyrrolidon, N-	Liquid	872-50-4	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Methyl 4-isopropenyl-1-cyclohexene, 1-	Liquid	5989-27-5	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Methyl N-nitrosomethanamine, N-	Liquid	62-75-9	>480	>480	>480	6	<0.001	0.001	<0.48	>480	6
Methyl acetyl	Liquid	67-64-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Methyl acrylate	Liquid	96-33-3	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Methyl amine (gaseous)	Vapor	74-89-5	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Methyl aniline, o-	Liquid	95-53-4	>480	>480	>480	6	<0.03	0.03	<14.4	>480	6
Methyl benzol	Liquid	108-88-3	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Methyl benzylamine, N-	Liquid	103-67-3	>480	>480	>480	6	>0.02	0.02	<9.6	>480	6
Methyl chloride (gaseous)	Vapor	74-87-3	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Methyl chloroform	Liquid	71-55-6	>480	>480	>480	6	<0.007	0.007	<3.36	>480	6
Methyl chloroformate	Liquid	79-22-1	99*	204*	>480	6	0.17	0.05	<24	>480	6
Methyl cyanide	Liquid	75-05-8	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Methyl ethyl ketone	Liquid	78-93-3	imm	40*	>480	6	0.36	0.001			
Methyl ethyl ketoxime	Liquid	96-29-7	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Methyl formamide, N-	Liquid	123-39-7	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Methyl hydrazine	Liquid	60-34-4	83*	183*	280*	5	0.98	0.01			
Methyl iodide	Liquid	74-88-4	254	296	>480	6	nm	0.07	53.6	>480	6
Methyl isocyanate	Liquid	624-83-9	imm	4*	>480	6	0.42	0.001			

BT Act (Actual) Breakthrough time at MDPR [mins] BT 0.1 Normalized breakthrough time at 0.1 µg/cm²/min [mins] BT 1.0 Normalized breakthrough time at 1.0 µg/cm²/min [mins] EN Classification according to EN 14325
 SSPR Steady state permeation rate [µg/cm²/min] MDPR Minimum detectable permeation rate [µg/cm²/min] CUM 480 Cumulative permeation mass after 480 mins [µg/cm²] Time 150 Time to reach cumulative permeation mass of 150 µg/cm² [mins] ISO Classification according to ISO 16602 CAS Chemical abstracts service registry number mins Minutes > Larger than < Smaller than imm Immediate (< 4 min) nm Not tested
 sat Saturated solution N/A Not Applicable * Based on lowest single value na Not attained 8 Actual breakthrough time; normalized breakthrough time is not available

Permeation Data for Tychem® 6000 FR

Hazard Name	Physical State	CAS	BT Act	BT 0.1	BT 1.0	EN	SSPR	MDPR	Cum 480	Time 150	ISO
Methyl mercaptan	Vapor	74-93-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Methyl methacrylate	Liquid	80-62-6	4*	8*	180*	4	1.4	0.001			
Methyl pentan-2-one, 4-	Liquid	108-10-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Methyl propan-2-ol, 2-	Liquid	75-65-0	10*	37*	>480	6	0.26	0.02			
Methyl propenoic acid, 2-	Liquid	79-41-4	>480	>480	>480	6	<0.0001	0.0001	<0.04	>480	6
Methyl pyridine, 2-	Liquid	109-06-8	>480	>480	>480	6	<0.024	0.024	<11.5	>480	6
Methyl pyridine, 3-	Liquid	108-99-6	>480	>480	>480	6	<0.024	0.024	<11.5	>480	6
Methyl tert-butyl ether	Liquid	1634-04-4	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Methyl trichloromethane	Liquid	71-55-6	>480	>480	>480	6	<0.007	0.007	<3.36	>480	6
Methyl trichlorosilane	Liquid	75-79-6	>480	>480	>480	6	<0.0001	0.0001	<0.04	>480	6
Methyl vinyl ketone	Liquid	78-94-4	287*	>480	>480	6	<0.02	0.02	<9.6	>480	6
Methylene bromide	Liquid	74-95-3	imm	imm	20	1	111	0.05			
Methylene chloride	Liquid	75-09-2	imm	imm	imm		12.7	0.04			
Methylene diphenyl diisocyanate, 4,4'- (50 °C, molten)	Liquid	101-68-8	>480	>480	>480	6	<0.0403	0.0403	<19.3	>480	6
Naphthalene	Solid	91-20-3	>480	>480	>480	6	<0.001	0.001	<0.48	>480	6
Naphthalene (25% in Diethylene glycol dimethylether)	Liquid	91-20-3	>480	>480	>480	6	<0.007	0.007	<3.36	>480	6
Neoprene (50% in Butanol)	Liquid	126-99-8	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Nicotine	Liquid	54-11-5	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Nitric acid (50%)	Liquid	7697-37-2	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Nitric acid (70%)	Liquid	7697-37-2	75*	105*	135*	4	na	0.05	>2400	nm	
Nitric acid, red fuming (90%)	Liquid	52583-42-3	imm	imm	imm		na	0.08	992, 16 min	10	1
Nitro benzene	Liquid	98-95-3	>480	>480	>480	6	<0.04	0.04	<19.2	>480	6
Nitro chlormethan	Liquid	76-06-2	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Nitro methane	Liquid	75-52-5	157	233	nm		0.97	0.001			
Nitro propane, 2-	Liquid	79-46-9	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Nitrogen dioxide	Vapor	10102-44-0	<15	<15	nm		>0.2	0.01			
Oleum (20%)	Liquid	8014-95-7	14*	15*	26*	2	na	0.06	137, 60 min	62	3
Oxalic acid (sat)	Liquid	144-62-7	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
PCB 1254 (50% in Trichlorbenzene)	Liquid	11097-69-1	324*	>480	>480	6	0.032	0.01			6
Pentachloroantimony	Liquid	7647-18-9	<15	<15	<15	1	>10	0.1			
Pentanedial, 1,5- (50%)	Liquid	111-30-8	150	170	200	4	1.861	0.01			
Pentanol, 1- (mix)	Liquid	71-41-0	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Pentene nitrile, 2-	Liquid	13284-42-9	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Pentyl acetate	Liquid	628-63-7	12*	136*	>480	6	0.007	0.001			
Phenethylene	Liquid	100-42-5	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Phenol (45 °C, molten)	Liquid	108-95-2	22	25	29	1	na	0.05	>355, 120 min	56	2
Phenol (85%)	Liquid	108-95-2	>480	>480	>480	6	<0.05	0.05	<6	>480	6
Phenyl acetonitrile	Liquid	140-29-4	>390	>390	>390	5	<0.01	0.01	<4.8	>480	6
Phenyl amine	Liquid	62-53-3	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6

BT Act (Actual) Breakthrough time at MDPR [mins] BT 0.1 Normalized breakthrough time at 0.1 µg/cm²/min [mins] BT 1.0 Normalized breakthrough time at 1.0 µg/cm²/min [mins] EN Classification according to EN 14325
 SSPR Steady state permeation rate [µg/cm²/min] MDPR Minimum detectable permeation rate [µg/cm²/min] CUM 480 Cumulative permeation mass after 480 mins [µg/cm²] Time 150 Time to reach cumulative permeation mass of 150 µg/cm² [mins] ISO Classification according to ISO 16602 CAS Chemical abstracts service registry number mins Minutes > Larger than < Smaller than imm Immediate (< 4 min) nm Not tested
 sat Saturated solution N/A Not Applicable * Based on lowest single value na Not attained 8 Actual breakthrough time; normalized breakthrough time is not available

Permeation Data for Tychem® 6000 FR

Hazard Name	Physical State	CAS	BT Act	BT 0.1	BT 1.0	EN	SSPR	MDPR	Cum 480 Time 150	ISO	
Phenyl cyanide	Liquid	100-47-0	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Phenyl ethane	Liquid	100-41-4	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Phenyl propane, 2-	Liquid	98-82-8	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Phenyl trichlorosilane	Liquid	98-13-5	>480	>480	>480	6	<0.0001	0.0001	<0.04	>480	6
Phosgene	Vapor	75-44-5	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Phosphine	Vapor	7803-51-2	imm	imm	nm		>0.11	0.003			
Phosphinic acid (50%)	Liquid	6303-21-5	>480	>480	>480	6	<0.09	0.09	<43.2	>480	6
Phosphoric acid (85%)	Liquid	7664-38-2	105*	>480	>480	6	<0.02	0.02	10.75	>480	6
Phosphorus oxychloride	Liquid	10025-87-3	nm	>480	>480	6	<0.01	0.01	<4.8	>480	6
Phosphorus trichloride	Liquid	7719-12-2	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Picoline, 2-	Liquid	109-06-8	>480	>480	>480	6	<0.024	0.024	<11.5	>480	6
Picoline, 3-	Liquid	108-99-6	>480	>480	>480	6	<0.024	0.024	<11.5	>480	6
Pimelic ketone	Liquid	108-94-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Polymethylene polyphenyle isocyanate (p-MDI)	Liquid	9016-87-9	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Potassium chromate (sat)	Liquid	7789-00-6	>480	>480	>480	6	<0.08	0.08	<38.4	>480	6
Potassium hydroxide (45%)	Liquid	1310-58-3	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Potassium hydroxide (50%)	Liquid	1310-58-3	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Prop-2-en-1-al	Liquid	107-02-8	51*	75*	>480	6	<0.5	0.02	105	>480	6
Prop-2-yn-1-ol	Liquid	107-19-7	123	123	127	4	37.9	0.07			
Propan -1-ol	Liquid	71-23-8	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Propan -2-ol	Liquid	67-63-0	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Propan -2-ol (70%)	Liquid	67-63-0	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Propan -2-one	Liquid	67-64-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Propanol, 1-	Liquid	71-23-8	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Propanol, n-	Liquid	71-23-8	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Propargyl alcohol	Liquid	107-19-7	123	123	127	4	37.9	0.07			
Propen 1-ol, 2-	Liquid	107-18-6	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Propenamide (50%)	Liquid	79-06-1	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Propene acid	Liquid	79-10-7	>480	>480	>480	6	<0.06	0.06	<28.8	>480	6
Propenenitrile, 2-	Liquid	107-13-1	4	8*	>480	6	0.57	0.01			
Propenoic acid nitrile	Liquid	107-13-1	4	8*	>480	6	0.57	0.01			
Propyl alcohol	Liquid	71-23-8	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Propyl amine, n-	Liquid	107-10-8	7	16*	>480	6	0.52	0.05			
Pyridene, 2-fluoro-6-(trifluoromethyl)	Liquid	94239-04-0	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Pyridine	Liquid	110-86-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Pyroacetic ether	Liquid	67-64-1	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Pyrrolidine	Liquid	123-75-1	40*	45*	145*	4	4.7	0.05			
Sarin (GB), FINABEL 0.7.C	Liquid	107-44-8		>1400 8							
Sarin (GB), MIL-STD-282 (100 g/m ²)	Liquid	107-44-8		>480 ⁸							

BT Act (Actual) Breakthrough time at MDPR [mins] BT 0.1 Normalized breakthrough time at 0.1 µg/cm²/min [mins] BT 1.0 Normalized breakthrough time at 1.0 µg/cm²/min [mins] EN Classification according to EN 14325
 SSPR Steady state permeation rate [µg/cm²/min] MDPR Minimum detectable permeation rate [µg/cm²/min] CUM 480 Cumulative permeation mass after 480 mins [µg/cm²] Time 150 Time to reach cumulative permeation mass of 150 µg/cm² [mins] ISO Classification according to ISO 16602 CAS Chemical abstracts service registry number mins Minutes > Larger than < Smaller than imm Immediate (< 4 min) nm Not tested
 sat Saturated solution N/A Not Applicable * Based on lowest single value na Not attained 8 Actual breakthrough time; normalized breakthrough time is not available

Permeation Data for Tychem® 6000 FR

Hazard Name	Physical State	CAS	BT Act	BT 0.1	BT 1.0	EN	SSPR	MDPR	Cum 480	Time 150	ISO
Silicon tetrachloride	Liquid	10026-04-7	>480	>480	>480	6	<0.0001	0.0001	<0.04	>480	6
Sodium cyanide (sat)	Liquid	143-33-9	>480	>480	>480	6	<0.07	0.07	<33.6	>480	6
Sodium hydroxide (50%)	Liquid	1310-73-2	>480	>480	>480	6	<0.025	0.025	<12	>480	6
Sodium hypochlorite (15%)	Liquid	7681-52-9	>480	>480	>480	6	<0.03	0.03	<14.4	>480	6
Soman (GD), FINABEL 0.7.C	Liquid	96-64-0		>1400 ⁸							
Soman (GD), MIL-STD-282 (100 g/m ²)	Liquid	96-64-0		>480 ⁸							
Spiritus	Liquid	64-17-5	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Styrene	Liquid	100-42-5	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Sulfur Mustard (HD), FINABEL 0.7.C	Liquid	505-60-2		>1400 ⁸							
Sulfur Mustard (HD), MIL-STD-282 (100 g/m ²)	Liquid	505-60-2		>480 ⁸							
Sulfur dioxide	Vapor	7446-09-5	24*	24*	24*	1	2.6	0.34			
Sulfuric acid (30%)	Liquid	7664-93-9	>480	>480	>480	6	<0.025	0.025	<12	>480	6
Sulfuric acid (50%)	Liquid	7664-93-9	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Sulfuric acid (70%)	Liquid	7664-93-9	>480	>480	>480	6	<0.025	0.025	<12	>480	6
Sulfuric acid (>95%)	Liquid	7664-93-9	30*	50	50	2	na	0.05	>5000	nm	
Sulfuric acid diethyl ester	Liquid	64-67-5	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Sulfuric acid dimethyl ester	Liquid	77-78-1	>480	>480	>480	6	<0.09	0.09	<43.2	>480	6
Sulfuric acid fuming (20%)	Liquid	8014-95-7	14*	15*	26*	2	na	0.06	137, 60 min	62	3
Sulfuryl chloride	Liquid	7791-25-5	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Tabun (GA), FINABEL 0.7.C	Liquid	77-81-6		>1400 ⁸							
Tabun (GA), MIL-STD-282 (100 g/m ²)	Liquid	77-81-6		>480 ⁸							
Tetrachloro bisphenol-A, 2,2',6,6'-	Solid	79-95-8	>480	>480	>480	6	<0.1	0.1	<48	>480	6
Tetrachloro ethane, 1,1,2,2,-	Liquid	79-34-5	>480	>480	>480	6	<0.008	0.008	<3.84	>480	6
Tetrachloro ethylene, 1,1,2,2,-	Liquid	127-18-4	210*	>480	>480	6	<0.03	0.02	9.81	>480	6
Tetrachloro methane	Liquid	56-23-5	4*	4*	>480	6	0.57	0.001			
Tetraethylene pentamine	Liquid	112-57-2	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Tetrahydrofuran	Liquid	109-99-9	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Tetramethyl ammonium hydroxide (25%)	Liquid	75-59-2	>480	>480	>480	6	<0.025	0.025	<12	>480	6
Thioglycolic acid	Liquid	68-11-1	>480	>480	>480	6	<0.0001	0.0001	<0.04	>480	6
Thionyl chloride	Liquid	7719-09-7	21	21	33	3	nm	0.1	nm	47	2
Tin chloride, mono-n-butyl	Liquid	1118-46-3	>480	>480	>480	6	<0.0001	0.0001	<0.04	>480	6
Tin chloride, tri-n-butyl	Liquid	1461-22-9	nm	nm	>480	6	nm	0.2			
Titan(IV) chloride	Liquid	7550-45-0	>480	>480	>480	6	<0.0001	0.0001	<0.04	>480	6
Titanium tetrachloride	Liquid	7550-45-0	>480	>480	>480	6	<0.0001	0.0001	<0.04	>480	6
Toluene	Liquid	108-88-3	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Toluene diisocyanate, 2,4-	Liquid	584-84-9	>480	>480	>480	6	<0.0281	0.0281	<13.5	>480	6
Toluene diisocyanate, 2,4- (80%)	Liquid	584-84-9	>480	>480	>480	6	<0.0281	0.0281	<13.5	>480	6
Toluidine, o-	Liquid	95-53-4	>480	>480	>480	6	<0.03	0.03	<14.4	>480	6
Trichloro acetic acid (sat)	Liquid	76-03-9	>480	>480	>480	6	<0.1	0.1	<48	>480	6

BT Act (Actual) Breakthrough time at MDPR [mins] BT 0.1 Normalized breakthrough time at 0.1 µg/cm²/min [mins] BT 1.0 Normalized breakthrough time at 1.0 µg/cm²/min [mins] EN Classification according to EN 14325
 SSPR Steady state permeation rate [µg/cm²/min] MDPR Minimum detectable permeation rate [µg/cm²/min] CUM 480 Cumulative permeation mass after 480 mins [µg/cm²] Time 150 Time to reach cumulative permeation mass of 150 µg/cm² [mins] ISO Classification according to ISO 16602 CAS Chemical abstracts service registry number mins Minutes > Larger than < Smaller than imm Immediate (< 4 min) nm Not tested sat Saturated solution N/A Not Applicable * Based on lowest single value na Not attained 8 Actual breakthrough time; normalized breakthrough time is not available

Permeation Data for Tychem® 6000 FR

Hazard Name	Physical State	CAS	BT Act	BT 0.1	BT 1.0	EN	SSPR	MDPR	Cum 480 Time 150	ISO	
Trichloro benzene, 1,2,4-	Liquid	120-82-1	>480	>480	>480	6	<0.001	0.001	<0.48	>480	6
Trichloro ethane, 1,1,1-	Liquid	71-55-6	>480	>480	>480	6	<0.007	0.007	<3.36	>480	6
Trichloro ethane, 1,1,2-	Liquid	79-00-5	120*	164*	202*	4	9.1	0.01			
Trichloro ethanol, 2,2,2-	Liquid	115-20-8	>480	>480	>480	6	<0.008	0.008	<3.84	>480	6
Trichloro ethylene	Liquid	79-01-6	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Trichloro methane	Liquid	67-66-3	4*	8	8		10.6	0.001			
Trichloro phenylsilane	Liquid	98-13-5	>480	>480	>480	6	<0.0001	0.0001	<0.04	>480	6
Trichloro silane	Liquid	10025-78-2	nm	>480	>480	6	<0.0218	0.0218	<9.6	>480	6
Triethyl amine	Liquid	121-44-8	>480	>480	>480	6	0.05	0.05	<24	>480	6
Triethylenetetramine (60%)	Liquid	112-24-3	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Trifluoro 2-(trifluoromethyl)propene, 3,3,3-	Vapor	382-10-5	>480	>480	>480	6	<0.005	0.005	<2.4	>480	6
Trifluoro acetic acid	Liquid	76-05-1	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Trifluoro methansulfonic acid	Liquid	1493-13-6	>480	>480	>480	6	<0.01	0.01	<4.8	>480	6
Trimethyl chinon (30 °C, molten)	Liquid	935-92-2	nm	nm	>480	6	nm	0.05			
VX Nerve Agent, FINABEL 0.7.C	Liquid	50782-69-9		>1400 ⁸							
VX Nerve Agent, MIL-STD-282 (100 g/m ²)	Liquid	50782-69-9		>480 ⁸							
Vinyl benzol	Liquid	100-42-5	>480	>480	>480	6	<0.05	0.05	<24	>480	6
Vinyl carbinol	Liquid	107-18-6	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Vinyl chloride	Vapor	75-01-4	imm	>480	>480	6	0.02	0.001	<9.6	>480	6
Vinyl cyanide	Liquid	107-13-1	4	8*	>480	6	0.57	0.01			
Vinyl ethylene (gaseous)	Vapor	106-99-0	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
Vinylidene chloride	Liquid	75-35-4	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6
White spirit	Liquid	mix	>480	>480	>480	6	<0.02	0.02	<9.6	>480	6

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 SSPR Steady state permeation rate [µg/cm²/min] MDPR Minimum detectable permeation rate [µg/cm²/min] CUM 480 Cumulative permeation mass after 480 mins [µg/cm²] Time 150 Time to reach cumulative permeation mass of 150 µg/cm² [mins] ISO Classification according to ISO 16602 CAS Chemical abstracts service registry number mins Minutes > Larger than < Smaller than imm Immediate (< 4 min) nm Not tested sat Saturated solution N/A Not Applicable * Based on lowest single value na Not attained 8 Actual breakthrough time; normalized breakthrough time is not available

Important Note

The permeation data published have been generated for DuPont by independent accredited testing laboratories according to the test method applicable at that time (EN369, ASTM F739, EN 374-3, EN ISO 6529 (method A and B) or ASTM D6978)

The data is typically the average of three fabrics samples tested.

All chemicals have been tested at an assay of greater than 95 (w/w) % unless otherwise stated.

The tests were performed at room temperature and environmental pressure unless otherwise stated.

A different temperature may have significant influence on the breakthrough time.

Permeation typically increases with temperature.

Cumulative permeation data have been measured or have been calculated based on steady state permeation rate.

Cytostatic drugs testing has been performed at a test temperature of 27°C according to ASTM D6978 or ISO 6529 with the additional requirement of reporting a normalized breakthrough time at 0.01 µg/cm²/min.

Chemical warfare agents (Lewisite, Sarin, Soman, Mustard, Tabun and VX Nerve Agent) have been tested according to MIL-STD-282 at 22°C or according to FINABEL 0.7 at 37°C.

Permeation data for Tyvek® is applicable to white Tyvek® 500/ Tyvek® 600 only and is not applicable for other Tyvek® styles or colours.

Permeation data are usually measured for single chemicals. The permeation characteristics of mixtures can often deviate considerably from the behaviour of the individual chemicals.

Please use the permeation data provided as a part of the risk assessment to assist with the selection of a protective fabric, garment or accessory suitable for your application. Breakthrough time is not the same as safe wear time. Breakthrough times are indicative of the barrier performance, but results can vary between the test methods and laboratories. Breakthrough time alone is insufficient to determine how long a garment may be worn once the garment has been contaminated. Safe user wear time may be longer or shorter than the breakthrough time depending on the permeation behaviour of the substance, the toxicity of the substance, working conditions and the exposure conditions (e.g. temperature, pressure, concentration, physical state).

Latest Update Permeation Data: 30/05/2018

- MTO: Made to order terms & conditions apply.

The information provided herein corresponds to our knowledge on the subject at the date of its publication. This information may be subject to revision as new knowledge and experience becomes available. The data provided fall within the normal range of product properties and relate only to the specific material designated; these data may not be valid for such material used in combination with any other materials or additives or in any process, unless expressly indicated otherwise. The data provided should not be used to establish specification limits or used alone as the basis of design; they are not intended to substitute for any testing you may need to conduct to determine for yourself the suitability of a specific material for your particular purposes. Since DuPont cannot anticipate all variations in actual end-use conditions DuPont makes no warranties and assumes no liability in connection with any use of this information. Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any patent rights.

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For further product information, literature and as well as assistance in locating a local supplier, please visit:

www.safespec.dupont.co.uk

The footnotes can be found on the SafeSPEC™ website.

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